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SUGHRUE, MION, ZINN, MACPEAK & SEAS  
2100 PENNSYLVANIA AVENUE  
WASHINGTON, DC 200373202

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* GIUSEPPE GUARINO  
and ERMANNO FILIPPI

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Appeal 2008-0412  
Application 09/231,791  
Technology Center 1700

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Decided: August 13, 2008

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Before CHARLES F. WARREN, THOMAS A. WALTZ, and  
JEFFERY T. SMITH, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Primary Examiner's final rejection of claims 1 through 10 which are the only claims pending in this application. We have jurisdiction pursuant to 35 U.S.C. § 6(b).<sup>1</sup>

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<sup>1</sup> An Oral Hearing for this appeal was held on July 8, 2008.

According to Appellants, the invention is directed to a heterogeneous synthesis reactor and a method for in-situ modernization of a heterogeneous synthesis reactor. (App. Br. 6).<sup>2</sup> Independent claims 1 and 6 are illustrative of the invention and are reproduced below:

1. A method for in-situ modernization of a heterogeneous synthesis reactor, including an external shell comprising at least a catalytic bed (6) provided with a gas inlet perforated cylindrical wall (7) and a gas outlet perforated cylindrical wall (8), said method comprising the steps of:

providing an unperforated cylindrical wall (15) coaxial to said gas outlet wall (8) in said catalytic bed (6), said unperforated cylindrical wall (15) extending from an upper end (8a) of said gas outlet wall (8) along a perforated portion of said gas outlet wall and for a predetermined length in said catalytic bed such that once the catalyst (14) is loaded within said catalytic bed (6) at least a portion of said unperforated cylindrical wall (15) remains below the upper level (13) reached by said catalyst (14), so as to define a free-space (16) between the perforated gas outlet wall (8) and the unperforated wall (15), for the passage of a part of the gas leaving said catalytic bed (6) through said portion of the gas outlet wall (8) facing said free-space (16), said free space (16) having a thickness great enough to allow said passage without causing an additional pressure drop;

providing a capping means (17) for closing an upper end of said free-space (16) between the unperforated wall (15) which extends below the upper level (13) reached by said catalyst (14) and the gas outlet wall (8), in proximity of the upper end (8a) of the wall (8), preventing thereby a bypass of said catalytic bed or a recycling to the catalytic bed of the gas entering and leaving the reactor, respectively.

6. A heterogeneous synthesis reactor comprising:

an external shell (2);

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<sup>2</sup> We refer to and cite from the Appellants' Briefs dated December 14, 2006 and June 04, 2007.

at least a radial or axial-radial catalytic bed (6), provided with a gas inlet perforated cylindrical wall (7) and a gas outlet perforated cylindrical wall (8), extended in said shell (2);

characterized in that it further comprises in said catalytic bed:

an unperforated cylindrical wall (15) coaxial to said gas outlet wall (8) in said catalytic bed (6), said unperforated cylindrical wall (15) extending from an upper end (8a) of said gas outlet wall (8) along a perforated portion of said gas outlet wall and for a predetermined length in said catalytic bed (6) such that once the catalyst (14) is loaded within said catalytic bed (6) at least a portion of said unperforated cylindrical wall (15) remains below the upper level (13) reached by said catalyst (14), so as to define a free-space (16) between the perforated gas outlet wall (8) and the unperforated wall (15), for the passage of a part of the gas leaving said catalytic bed (6) through said portion of the gas outlet wall (8) facing said free-space (16), said free space (16) having a thickness great enough to allow said passage without causing an additional pressure drop;

a cap (17) which closes said free-space (16) between the unperforated wall (15) and the gas outlet wall (9), in proximity of the upper end (8a) of the latter, preventing thereby a bypass of said catalytic bed or a recycling to the catalytic bed of the gas entering and leaving the reactor respectively.

The Examiner has relied on the following prior art reference as evidence of obviousness:

Poussin

5,202,097

Apr. 13, 1993

## ISSUES ON APPEAL

The rejection of claims 1-10 under 35 U.S.C. § 103(a) over Poussin has been presented for review in this appeal.<sup>3</sup>

Appellants contend that the unperforated cylindrical wall 10 of Poussin remains above the upper level reached by the catalyst, as recited in claims 1 and 6. (App. Br. 14-15). Appellants contend that the unperforated cylindrical wall of Poussin does not extend along a perforated portion of the gas outlet wall 9. (Reply Br. 4-5). Appellants contend that the phrase "which is generally a perforated tube," is at best a vague teaching. (Reply Br. 5). The perforations appear to be shown schematically in the gas outlet wall 9 as only being located within the catalytic bed 31. The upper and lower ends of the gas outlet wall 9 are not provided with perforations since the upper and lower ends of the gas outlet tube are not surrounded or in contact with the catalytic bed. (Reply Br. 5). Thus, Appellants contend that the cylindrical wall portion of the cap 10 clearly does not extend along a perforated portion of the gas outlet wall for a predetermined length in said catalytic bed. (Reply. Br. 6).

Based on the totality of the record presented in this appeal, we determine that the Examiner has established a prima facie case of obviousness, which prima facie case has not been adequately rebutted by Appellants' arguments. Accordingly, we sustain the rejection; our reasons follow.<sup>4</sup>

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<sup>3</sup> The Examiner has withdrawn the rejection under 35 U.S.C. § 112, first paragraph. (Ans. 2).

<sup>4</sup> Appellants have not separately addressed each of the dependent claims 2-5 and 7-10. Appellants also have grouped the arguments for claim 1 and 6 together. Consequently, claims 2-5 and 7-10 will stand or fall with

Therefore, the decision of the Examiner is AFFIRMED.

### OPINION

We determine the following Findings of Fact (FF) from the record presented in this appeal:

- (1) Poussin discloses the unperforated cylindrical wall of the cap (10) covers the side portions of the central stack (9) that is generally perforated. (Fig. 1; col. 7, ll. 17-22).
- (2) Poussin discloses that the cap (10) is immersed in the catalyst bed and functions to seal the central stack (9) with respect to the charge. (Col. 7, ll. 20-22).
- (3) Poussin's Figs. 1 and 6 exhibit that the side portions of the cap (10) do not seal the side portions of the central stack (9).
- (4) Poussin discloses that the perforated central stack (9) that comprises perforations is covered by a grid (30). This grid would prevent the side portions of the cap (10) from sealing the side portions of the central stack (9) thus providing a gap surrounding the central stack. (Fig. 2; col. 7, ll. 16-18)
- (5) The Examiner determined that the figures of Poussin are schematic and do not demonstrate the sole locations of perforations in the tube.<sup>5</sup> (Ans. 4 ).

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independent claims 1 and 6. Therefore, our analysis will be limited to claim 1. Appellants have provided separate arguments addressed to claims 3 and 8 together. As indicated below, we have considered all separate arguments for patentability of the rejected claims.

<sup>5</sup> Appellants have not disputed this finding in their Briefs.

- (6) Poussin Figs. 2 and 8 exhibit additional perforations in the tube (9) that were not illustrated in Fig. 1.
- (7) Reactors comprising catalytic beds that have holes in the gas inlet and outlet walls that are not covered by catalysts result in the undesired bypass of the reaction gas and corresponding reduction in the reactor yield. (Spec. 2).

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations, if any. *See Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). “[A]nalysis [of whether the subject matter of a claim is obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1740 (2007). “[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *Id.*

“For obviousness under § 103, all that is required is a reasonable expectation of success.” *In re O’Farrell*, 853 F.2d 894, 904, 7 (Fed. Cir. 1988).

Applying the preceding legal principles to the Factual Findings (FF) in the record of this appeal, we determine that the Examiner has established a prima facie case of obviousness, which prima facie case has not been adequately rebutted by Appellants’ arguments. As shown by FF (1) listed

above, Poussin discloses the central stack (9) is generally perforated. The cap (10) that covers the central stack (9), functions to seal the central stack (9) with respect to the charge. (FF (2)). Poussin discloses that the cap 10 is immersed in the catalyst bed. (FF (2)) The figures of Poussin are schematic and do not demonstrate the sole locations of perforations in the tube. (FF (4)). Based on the teachings of Poussin, a person of ordinary skill in the art would have reasonably expected that the cap (10) would cover perforations in the central stack (9) that extend above the catalyst bed and any perforations that extended above the catalyst bed would have been sealed by the cap (10). As shown by FF (10), yield conversion of the reactor is reduced if the holes in the gas inlet and outlet are left uncovered by catalysts. A person of ordinary skill in the art would have reasonably expected that the central stack (9) should be designed to prevent holes contained therein from extending above the amount of catalysts loaded into the reactor and further including a cap (10) to seal the central stack (9) from the charge whether or not perforations extend above the catalyst bed. “For obviousness under § 103, all that is required is a reasonable expectation of success.” *O’Farrell*, F.2d at, 904.

Appellants argue that Poussin does not have the spacing between the cap (10) and central stack (9) as required by claim 3.<sup>6</sup> (App. Br. 16). First, Appellants submit that the Examiner’s assertions of routing optimization for determining the space between the cap and the central stack is improper because the recited free space has not been recognized as a result effective variable. (App. Br. 16). Second, with regard to the Examiner’s suggested

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<sup>6</sup> App. Br. 16 indicates claim 2; however, this claim does not describe the free space (16).



modification by changing size and shape, Appellants submit that because the present invention performs a function not disclosed in Poussin, and the recited dimensions of the free space are directed to the performance of this function, that the suggested modification would not be obvious to one having ordinary skill in the art. In particular, the present invention is the provision of a free space between the unperforated cylindrical wall and the gas outlet perforated cylindrical wall, having a thickness great enough not to cause additional pressure drop to the portion of reacted gases leaving the catalyst mass and passing through said free space. (Spec. 11, lines 25-32). (App. Br. 17).

Appellants' arguments are not persuasive because Appellants have not established the criticality of the gap between the unperforated cylindrical wall and the gas outlet. Poussin's figures exemplify that a space is present between the central stack (9) and cap (10). (FF (6)). Further, Poussin discloses that the central stack (9) can be covered by a grid (30) that would provide a space between the cap (10) and the central stack (9). (FF (6)). Appellants have not asserted that the gap present in Poussin would not provide the pressure drop characteristic. It is noted that the production capacity of the reactor is controlled by several variables including reaction, gas pressure and the type of catalyst utilized. (Spec. 11-12). Appellants have not directed us to evidence that the pressure drop characteristic is related to the claimed gap between the unperforated cylindrical wall and the gas outlet. Moreover, it appears that the drop in pressure would result from gas escaping from the holes in the central stack that are located above the amount of catalysts loaded into the reactor. (See FF (10)).

Appellants contend that Poussin fails to teach or suggest at least a portion of said unperforated cylindrical wall (15) remains below the upper level (13) reached by said catalyst, as recited in claims 1 and 6. (App. Br. 14). This argument is not persuasive because the catalyst is not part of the structure of the reactor. The level of catalyst reached in the reactor is based upon the later loading of catalysts to the reactor.

For the foregoing reasons and those stated in the Answer, we sustain the Examiner's rejection under § 103(a) of (1) claims 1-10 over Poussin.

ORDER

The rejections of claims 1-10 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

SUGHRUE, MION, ZINN,  
MACPEAK & SEAS  
2100 PENNSYLVANIA AVENUE  
WASHINGTON, DC 20037-3202